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Date: 3/17/03 10:18AM
Subject: Rev. 0, Event Review Team Timeline - March 2003 MP-2 Reactor Trip

Please review the forwarded Unit 2 March 7,2003 Reactor Trip event timeline, Rev0, which has been prepared by Robert Borchert with input from various sources. Additionally, the charging specific issues were reviewed by Tom Ripple.

Please be aware that this timeline is intended to be expanded in content based upon additional discoveries, your feedback, and planned verification/validation of specific timeline items.

Alex House
Dominion Nuclear Connecticut, Inc.
Millstone Root Cause Program Coordinator
(860)447-1791 x0827
----- Forwarded by Alex J House/MILLSTONE/VANCPOWER on 03/17/2003 10:01 AM

Robert A Borchert
03/17/2003 10:00 AM

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cc:
Subject: Rev. 0, Event Review Team Timeline - March 2003 MP-2 Reactor Trip

Alex,

Attached please find Rev. 0 of the Event Review Team Timeline for the MP-2 March 7, 2003 Reactor Trip. I have made two changes from the draft version that I sent out on 3/16/03.

Corrected a typographical error on page 13 ("Note" became "Not")
Changed time that PEO entered charging pump cubicle from 14:44 to 14:47 based on recent information from security gate logs

Please call me if you have any comments on this product

Borch

(See attached file: Mar_2003Timeline.doc)

B29

Time	Description of Event	Comment
	March 7, 2003	
13:21	Reactor operating at 100% power. CVCS operating within normally expected values: • "C" charging pump operating • Charging flow rate approximately 45 gpm • Letdown flow rate approximately 40 gpm • RCP bleedoff flow rate to VCT approximately 4 gpm • VCT level steady at approximately 85%	Pressurizer pressure ≈ 2250 psia Pressurizer level ≈ 65%
13:21	Released SP 2401D, "RPS Matrix Testing," for performance	High Risk Surveillance
14:07:54	I&C began RPS Matrix Testing – Trip Circuit Breakers (TCB) 1 and 5 were opened as part of test	
14:39:22	TCB-2 and TCB-6 were opened (as expected) while testing "A-C" matrix. TCB-1 and TCB-5 opened due to a switch malfunction.	**Reactor Trip** CR-03-02300
14:39:22 to 14:39:23	• Main turbine/generator trip • 6.9 KV and 4.16 KV breakers to NSST opened • 6.9 KV and 4.16 KV breakers to RSST closed • Main turbine stop valves and intercept valves closed • Generator exciter and field breakers opened	Normal trip response
14:39:25	All 61 control rods indicate fully inserted	
14:39:26 to 14:39:27	The following main steam safety valves indicated weeping: • 2-MS-252 • 2-MS-242 • 2-MS-246 • 2-MS-247 • 2-MS-245 • 2-MS-254	Not unusual to see 1 or 2 safety valves weep from a 100% power trip – 6 is more than expected Valves are listed in order that alarms were received
14:39:27	Pressurizer level Hi/Lo annunciator alarm received for both Channels "X" and "Y"	Alarm setpoints are: • 11% above program level • 5% below program level

Time	Description of Event	Comment
14:39:27	"A" and "B" charging pumps start • "B" charging pump started at 14:39:27.5038 • "A" charging pump started at 14:39:27.6129	Pressurizer level was 65.6% Pressurizer pressure was 2244 psia
14:39:28	Atmospheric steam dump valves opened	SG pressures were greater than the normal opening setpoint of 920 psia – No "Quick Open" signal – CR-03-02395
14:39:28 to 14:39:32	The following main steam safety valves opened: • 2-MS-242 • 2-MS-246 • 2-MS-254 • 2-MS-252 • 2-MS-247 • 2-MS-245	• Highest observed SG 1 pressure was 1008 psia • Highest observed SG 2 pressure was 1017 psia • Valves are listed in order that they opened • CR-03-02310
14:39:34 to 14:46	Charging header pressure (P212) indicated fluctuating pressure between 2000 and 2500 psig. Charging flow (F212) indicated fluctuations between 32 to 48 gpm with a general decreasing trend that settled out at about 38 gpm with a discharge header pressure of about 2667 psig at about 2 minutes following the start of the "A" and "B" charging pumps	All 3 charging pumps were operating
14:39:43 to 14:40:38	Several charging pump low lube oil pressure alarms were received and cleared for the "A" and "B" charging pumps	System Engineer says this is normal following start of an idle pump
14:39:49	"A" condenser steam dump valve opened	Valve appears to have modulated open on its normal opening setpoint of 880 psia – No "Quick Open" signal
14:40	Entered EOP 2525, "Standard Post Trip Actions"	
14:40:10 to 14:40:42	The 6 main steam safety valves closed	SG pressures were about 920 psia
14:40:29	Auxiliary Feedwater Auto Start signals generated – SG blowdown isolated – timer started for auto AFW pump start	Setpoint is SG level ≤ 26.8%

Time	Description of Event	Comment
14:41:32	Atmospheric steam dump valves closed	
14:41:49	"B," "C" and "D" condenser dump valves opened	Valves appears to have modulated open on their normal opening setpoint of 535°F – No "Quick Open" signal – CR-03-02305 and CR-03-02426
14:41:50	Radiation monitor RM-8997 (Radwaste Exhaust Particulate) indication begins to increase (reading about 450 cpm and increasing)	Was reading about 380 to 410 cpm prior to trip
14:41:51	"B," "C" and "D" condenser dump valves closed	
14:41:46 to 14:43:55	The 6 main steam safety valves stopped "weeping"	
14:42:27	"B" SGFP steam stop valves closed.	"A" SGFP remained operating
14:43:25 to 14:43:37	Heater drains pumps and 2 condensate pumps stopped	Normal post-trip actions
14:43:57 to 14:43:58	"A" and "B" Auxiliary Feedwater pumps automatically started	
14:44	Radiation monitor RM-8123A (Unit 2 Stack Particulate) indication begins to increase (reading about 125 cpm and increasing)	Was reading about 100 to 110 cpm prior to trip
14:46:25	Pressurizer Level Channel "Y" Lo-Lo level alarm received – all pressurizer heaters de-energized	Setpoint is ≤ 20%
14:47 to 14:48	• Main feedwater block valves closed (2-FW-42A and 2-FW-42B) • SGFP "B" discharge isolation valve closed (2-FW-38B)	Normal post-trip actions. Main FW supplied to SGs via bypass valves from "A" SGFP
14:47	Aux. Building PEO entered charging pump cubicle and noticed that water was gushing out of the discharge relief valve tell-tale holes at about 15 gpm each for the "B" and "C" charging pumps, and at about 2 gpm for the "A" charging pump. The PEO also noted that 3 valve hand wheels were lying on the floor.	Security gate log shows PEO entering through door 239E at 14:45:48 – reasonable time to reach charging pump area CR-03-02333
14:48	Entered TSAS 3.4.4.b, Action b (No pressurizer heaters are operable)	Pressurizer level < 20%
14:48:25 to 14:49:58	Numerous (14) charging low flow alarms are received	Setpoint is ≤ 25 gpm
14:49:00 to 14:50:26	Charging header pressure fluctuates between 2225 psig and 3089 psig. When pressure spikes to 3089 psig, flow decreases to zero. When pressure goes to 2250 psig, flow goes to about 28 gpm.	

Time	Description of Event	Comment
14:49	Entered TSAS 3.0.3 – No charging pumps are operable – can not meet requirements of LCO 3.1.2.2, 3.1.2.4 and 3.5.2.d	No indicated charging flow
14:50	Unit Supervisor (US) directed Plant Equipment Operator (PEO) to close discharge valves for "B" and "C" charging pumps	
14:50:20	"C" charging pump is stopped	SOE log shows pump • stopped at 14:50:20.832 • started at 14:50:20.8328 • stopped at 14:50:21.2311
14:50:28	Charging header pressure stops spiking – charging header pressure is about 2055 psig	"A" and "B" charging pumps are operating
14:50:28 to 14:50:34	Charging header flow increases from 0 to 18 gpm	
14:50:32 to 14:53:00	VCT level decrease stops and starts increasing	Level decreased from 85.1% to 81.2% from time of trip to time when "C" charging pump stopped
14:50:34	"B" charging pump is stopped	Charging flow goes to zero
14:52:35 to 14:52:39	Letdown isolation valves closed (2-CH-515 and 2-CH-516)	
15:00	• Radiation monitor RM-8997 (Radwaste Exhaust Particulate) indication has increased greater than 8000 cpm and continues to increase. • Radiation monitor RM-8123A (Unit 2 Stack Particulate) indication has increased to about 225 cpm	The highest value recorded by the PPC for RM-8123A was 249 cpm at 14:59:54.
15:00:07	Pressurizer Level Channel "Y" Lo-Lo level alarm cleared – backup pressurizer heaters energize	Caused by RCS heatup – ADV opened in response to heatup
15:03	"B" and "C" charging pumps isolated. "C" discharge relief valve is seated. "B" discharge relief valve is leaking at 10 gpm onto the floor	
15:03:41 to 15:03:44	Operators closed breakers for pressurizer proportional heaters	Pressurizer pressure ≈ 2075 psia
15:06:44	"A" charging pump is stopped	Pressurizer pressure ≈ 2148 psia Pressurizer level ≈ 23%
15:07:57	Pressurizer Level Channel "Y" Lo-Lo level alarm received – all pressurizer heaters de-energized	Setpoint is ≤ 20%

Time	Description of Event	Comment
15:09	Re-verified "B" and "C" charging pump discharge valves are closed. "B" discharge relief valve leaking at 0 gpm. "A" charging pump discharge relief valve leaking at 2 gpm.	CR-03-02301, CR-03-02311 , CR-03-02313, CR-03-02337
15:16	Shift Manager declared an "Unusual Event – Delta 1" due to RCS leakage	
15:16	Entered TSAS 3.4.6.2, Action b (RCS leakage)	Unidentified leak rate > 1 gpm
15:21	• Radiation monitor RM-8997 (Radwaste Exhaust Particulate) indication has increased to approximately 12000 cpm and begins to decrease • Radiation monitor RM-8123A (Unit 2 Stack Particulate) indication has decreased to about 195 cpm and continues to decrease.	The highest value recorded by the PPC for RM-8997 was 12589 cpm at 15:21:18.
15:23	"Unusual Event – Delta 1" message was released	IRF 2003012
15:24	PEO verified suction and discharge valves open on "A" charging pump with SRO	Dual verification
15:27:21	Started "A" charging pump. No indication of charging flow, no decrease in VCT level	Pressurizer pressure ≈ 2020 psia Pressurizer level ≈ 18%
15:45	An update to the "Unusual Event – Delta 1" message was released	
15:46	Station Duty Officer notified NRC of "Unusual Event – Delta 1"	
15:51	Aux. Building PEO noted that the "A" charging pump was hot. He could feel the heat radiating from the running pump. The suction stabilizer was too hot to hold a hand against. There was steam coming from the tell-tale hole on the discharge relief valve.	No indicated charging flow.
15:51:53	Stopped "A" charging pump	Pressurizer pressure ≈ 1950 psia Pressurizer level ≈ 17.7%
15:52	Entered EOP 2532, "Loss of Coolant"	
15:55	Decision made to align charging to "alternate charging flow path" via the HPSI system.	No log entries – time is speculated based on observed changes in SI header pressure that occurred at about 1600.
15:59	Placed Auto Aux. Feedwater Over-ride handswitch in pull-to-lock and secured "A" and "B" AFW pumps	AFW not needed. "A" SGFP maintaining SG levels

Time	Description of Event	Comment
16:00:30 to 16:01:00	Charging header pressure decreased from 1960 psig to about 370 psig, and SI header pressures increased from about 225 psig to about 360 psig.	Caused by opening cross-tie valves to HPSI header
16:04	Containment radiation monitor sample fans (F39A and F39B) were stopped.	These were stopped to align H_2 monitors for operation
16:05	Closed charging header isolation valve (2-CH-429)	
16:07	"A" charging pump discharge isolation valve closed (2-CH-339)	From "rough log"
16:05 to 16:20	Aux. Building PEO vents suction stabilizer for "A" charging pump. The pump discharge spool was also drained to the CVCS drains collection tank (which showed a level increase of 9%).	Times are approximate and are based on observed L9796 level change at 16:10.
16:20	Entered TSAS 3.5.2, Action a (Facility 1 HPSI is inoperable due to aligning to the alternate charging path)	
16:24	Verified "A" charging pump discharge isolation valve open	From "rough" log
16:24:37	Started "A" charging pump. No indication of charging flow through SI header, no decrease in VCT level, no increase in pressurizer level. Charging header pressure and SI header pressure increased to approximately 1875 psig and 1860 psig, respectively.	Pressurizer pressure ≈ 1862 psia Pressurizer level ≈ 17.2%
16:27:05	Stopped "A" charging pump.	
16:28:26	Opened RWST to charging suction isolation valve (2-CH-192)	
16:28:45	Closed VCT outlet isolation valve (2-CH-501)	
16:31:33	Started "A" charging pump. No indication of charging flow through SI header, no increase in pressurizer level.	Pressurizer pressure ≈ 1844 psia Pressurizer level ≈ 17%
16:32:43	Stopped "A" charging pump. PEO noted that the pump sounded bad, emitting a squealing noise when starting and stopping.	
16:35	Health Physics is taking containment air samples in case a containment entry is required.	
16:35	Not meeting RCS Inventory Safety Function for EOP 2532. Decision made to not transition to another EOP since best efforts were being made to recover inventory.	

Time	Description of Event	Comment
16:35	Decision made to restart the "C" charging pump with the discharge relief valve gagged (to stop the leak). A hose was fitted from the relief valve tell-tale hole to direct the leakoff to the floor drain (since the bellows on the relief valve was ruptured, the water was coming from the pump suction).	CR-03-02507
16:35 to 16:39	"C" charging pump discharge isolation valve opened	
16:37 to 16:43	Pressurizer Pressure Low - SIAS Block Permit alarms received	Setpoint is ≤ 1850 psia
16:38	An update to the "Unusual Event – Delta 1" message was released	IRF 2003013
16:42:47	"C" charging pump started. Charging header pressure and SI header pressure increased to approximately 1910 psig and 1840 psig, respectively. Indicated flow through loop 2A SI header increased from –37 gpm to approximately 15 gpm.	Pressurizer pressure ≈ 1818 psia Pressurizer level ≈ 17.1%
16:43	Pressurizer level observed to be increasing	
16:54	Exited TSAS 3.4.4, Action b. Pressurizer level > 20% - pressurizer heaters are operable	
16:55:43	Pressurizer Level Channel "Y" Lo-Lo level alarm cleared – backup pressurizer heaters energized.	Pressurizer level > 20%
17:29	Radiation monitor RM-8997 (Radwaste Exhaust Particulate) indication has decreased to < 3000 cpm	
17:30	Pressurizer pressure ≈ 1992 psia and pressurizer level ≈ 45%	RWST level is observed to be decreasing – expected response
17:37	Stopped RWST recirculating pumps due to RWST level < 95%	
18:00	Pressurizer pressure ≈ 1992 psia and pressurizer level ≈ 65%	
18:02:33	Stopped "C" charging pump	Pressurizer level is restored, no letdown available
18:05	Containment sump pumped. Consideration given to RCS leak outside containment. Sump level increase verified to be at a normal rate.	

Time	Description of Event	Comment
18:50:47	Started "B" charging pump – injecting via alternate charging flow path	No log entries nor other information available concerning opening of discharge isolation valve
18:53:35	Stopped "B" charging pump. Pressurizer level changed from 67% to 68.5% (as indicated by PPC level indication L110Y)	
19:36	Stopped "A" and "C" reactor coolant pumps	EOP 2541, Appendix 8, step 2
19:45	Commenced plant cooldown per EOP 2532	
19:56	Blocked SIAS per EOP 2532	
20:00	**Entered Mode 3*** (T_{ave} > 300°F, pressurizer pressure < 1750 psia)	
20:01	Exited TSAS 3.5.2, Action a for Facility 1 HPSI pump	No longer required for Mode 3*
20:04	Started "B" boric acid pump – aligned to charging pump suction.	
20:04:15	Started "B" charging pump – borating RCS via alternate charging flow path	
20:07	Placed "A" HPSI pump in pull-to-lock	EOP 2541, Appendix 8, step 9
20:10:43	Loose Parts Monitor Alarm re-set (received following reactor trip)	CR-03-02316
20:32	Blocked Main Steam Isolation (MSI) actuation signal	SG pressure < 700 psia
20:50	An update to the "Unusual Event – Delta 1" message was released for exceeding the time allowed per LCO 3.0.3 to place the unit in Hot Shutdown (Mode 4) – RCS temperature was ≈ 490°F	LCO 3.0.3 was entered at 14:49, TS require that the unit be in Mode 4 within 6 hours – CR-03-02315
21:20	Installed jumpers to remove SIAS open capability from LPSI injection valves	EOP 2541, Appendix 8, step 5
21:55	Stopped "B" boric acid pump – aligned charging pump suction to RWST	RCS temperature ≈ 433°F
21:57	US notified that the opening and closing coils for shutdown cooling suction and isolation valve (2-SI-651) are installed	EOP 2541, Appendix 8, step 6
22:18	Entered TRM 7.1, Table 7.1.7, Action a – valve 2-SI-651 is being made operable in preparation for SDC initiation (Appendix R)	SM Log should say "Action b"
22:29	Containment sump level begins increasing at a higher rate	Containment radiation monitor fans (F-39A and F-39B) are still "Off"

Time	Description of Event	Comment
22:54	Exit conditions for EOP 2532 are met – transitioned from EOP 2532 to OP 2207, Plant Cooldown	
23:00	Stopped "D" reactor coolant pump and started "A" reactor coolant pump to allow concurrent RCP and SDC operations	Auxiliary spray from charging is not available
23:13:59	"A" SGFP stopped – condenser backpressure ≈ 7 inches Hg and increasing	Steam pressure was too low to keep steam jet air ejectors running
23:21:57	"A" SGFP discharge isolation valve closed (2-FW-38A)	Feeding steam generators using "A" condensate pump
23:26	Started "A" auxiliary feedwater pump	
23:46:31	Received alarm for "Condenser Steam Dump/Bypass Vacuum" block	It appears that the operators broke condenser vacuum
23:58:15	Loose Parts Monitor alarm received	No explanation for this alarm given
March 8, 2003		
00:11:27	SG #1 Main Steam Isolation Valve (MSIV) closed	
00:13:27	PPC alarm received for high containment sump leak rate > 1 gpm	Containment radiation monitor fans (F-39A and F-39B) are still "Off" – radiation monitors not available
00:30:35	PPC alarm received for high containment sump leak rate = 1.657 gpm	
00:37:51	SG #2 MSIV closed	
00:50:27	Stopped "B" charging pump – RCS temperature ≈ 295°F	Pressurizer pressure ≈ 400 psia Pressurizer level ≈ 65%
01:08	**Entered Mode 4** (Hot Shutdown) – Holding pressurizer pressure ≈ 400 psia and RCS temperature ≈ 295°F for I&C LTOP surveillance	
01:18	Chemistry reports RCS boron concentration = 1142 ppm at 00:30	Shutdown Margin requirements satisfied
01:39	Placed "C" HPSI pump in pull-to-lock	OP 2207, step 4.12.6
01:44:15	PPC alarm cleared for high containment sump leak rate = 0.797 gpm	
01:46	Terminated "Unusual Event"	

Time	Description of Event	Comment
01:53 to 07:10	Numerous "C" reactor coolant pump seal controlled bleedoff high flow alarms received	
02:01	Pumped containment sump from 81% to 10%	
02:12:59	PPC alarm received for high containment sump leak rate = 1.006 gpm	
02:16 to 04:07	Numerous Facility 1 and Facility 2 ICCMS trouble alarms received	
02:20	"A" condensate pump stopped – feeding steam generators using "A" AFW pump	
02:43	Containment radiation monitor sample fans (F39A and F39B) were started	
02:45 to 02:52	PPC alarms received for containment particulate and containment gaseous radiation monitors rising	CR-03-02414
03:53:03 to 04:07:57	Containment radiation monitor sample fan F-39A stopped and started 3 times	Fan stopped to change filter paper
04:15:23 to 04:27:21	Containment radiation monitor sample fan F-39B stopped and started 3 times	Fan stopped to change filter paper – HP started a containment remote air sample from RM-8262 at 04:40
04:16:40	Started "A" LPSI pump for initial SDC preparations	SDC boron mixing
04:20	NRC phone check – NRC requested confirmation that "Unusual Event" had been terminated	Routine daily phone check
04:50	Pumped containment sump from 78% to 10%	
05:01:53	Stopped "A" LPSI pump	
05:05	Chemistry reports SDC boron concentration = 2077 ppm at 04:32	
05:09	Closed all Safety Injection Tank outlet isolation valves	OP 2207, step 4.9.4
05:46	Started "A" ESF room ventilation fan	
05:50	Established Low Temperature/Over Pressure (LTOP) protection	OP 2207, step 4.13

Time	Description of Event	Comment
05:53 to 06:05	Containment radiation monitor readings reached their highest values during this time: • RM-8123A (Z1 containment particulate) ≈ 1.1E+6 cpm • RM-8123B (Z1 containment gaseous) ≈ 16,000 cpm • RM-8262A (Z2 containment particulate) ≈ 582,000 cpm • RM-8262B (Z2 containment gaseous) ≈ 16,000 cpm	
06:00	Plant conditions at time of shift turnover to dayshift on 3/8/2003: • RCS temperature ≈ 278°F • Pressurizer pressure ≈ 352 psia • Pressurizer level ≈ 50% • "A" and "B" reactor coolant pumps operating • In procedure OP 2207, "Plant Cooldown" • Active TSAS: 3.0.3 (CVCS) and 3.3.3.8 (AVMS)	
07:30	Unit 2 stack gas radiation monitor (RM-8132B) increased from ≈ 48 cpm to over 100 cpm due to flushing of the RCS hot leg sample lines	
08:24	Pumped containment sump from 85% to 10%	
08:46	Chemistry reports RCS boron concentration = 1174 ppm at 08:04	
08:46:15	Started "B" charging pump – suction from RWST	Pressurizer pressure ≈ 351 psia Pressurizer level ≈ 44%
08:52 to 08:53	Stopped "B" and "C" circulating water pumps and cross-tied condenser waterboxes	
09:45	Both letdown backpressure control valves (2-CH-201P & Q) are reported un-isolated in preparation for placing letdown in service	
09:55:31	Stopped "B" charging pump	Pressurizer pressure ≈ 341 psia Pressurizer level ≈ 76%
10:22	Valve 2-SI-709 (Shutdown Cooling isolation) is open in preparation for shutdown cooling	
10:41	RCS pressure is less than 280 psia with RCPs in operation – starting 8 hour clock	8 hours clock is to prevent RCP seal degradation – CR-03-02314
11:00:49	Manual disconnect switch for valve 2-SI-652 closed	Shutdown cooling preparation

Time	Description of Event	Comment
11:05 to 11:07	Shutdown cooling isolation valves (2-SI-651 and 2-SI-652) opened	
11:07	Pumped containment sump from 79% to 8%	
11:22:05	Started "A" LPSI pump	Shutdown cooling initiation
11:49	Auxiliary building –45 foot elevation (Aerated waste tank room) is posted as a high radiation area	
11:50	Removing decay heat via shutdown cooling	Pressurizer pressure ≈ 256 psia Pressurizer level ≈ 73%
12:03	Auxiliary building –45 foot elevation ("A" and "B" ESF rooms) are posted as a high radiation areas due to shutdown cooling operation	
12:45	Commenced troubleshooting Reactor Protection System "A-C" matrix	
13:15	Started "B" boric acid pump for recirculation of "B" boric acid storage tank	
14:31	Pumped containment sump from 78% to 10%	No SM Log entry
14:42	Entering containment for air sampling prior to inspection	
14:51	Health Physics bypassed local alarm for charging pump area radiation monitor (RM-7894)	
14:55	Held briefing for radiography in charging pump area	
15:27	Pressurizer spray ΔT (main spray) exceed 200°F – Engineering notified	
15:36	**Entered Mode 5** – Exited TSAS 3.0.3, Entered TSAS 3.1.2.3 (no operable charging pumps)	T_{ave} < 200°F
15:37	Exited the following TSAS: • 3.1.2.4 (2 charging pumps operable) • 3.5.3.a (Operate HPSI and lower mode ECCS) Exited the following TRM: • 7.1.7, Table 7.1.7-1, item b (Appendix R for 2-SI-651) • 7.1.17, Table 7.1.17-1, items b and c (Appendix R for 2-MS-65A&B)	No longer applicable in Mode 5
15:48	Opened "A" charging pump circuit breaker per OP 2207, "Plant Cooldown"	

Time	Description of Event	Comment
16:01	Upon re-entry to containment found a leak from the "C" RCP vapor seal	Leak later reported to be approximately 1 to 2 gpm CR-03-02312
16:24:23	Started "B" charging pump raise pressurizer level and to add lithium for RCS pH control	Pressurizer pressure ≈ 252 psia Pressurizer level ≈ 46%
16:48:49	Stopped "B" charging pump	Pressurizer level ≈ 56%
16:50	Started radiography in the charging pump area	Radiation monitor alarms received due to radiography
17:05	Exited TSAS 3.3.3.8 (AVMS)	Not required in Mode 5
17:47	Pumped containment sump from 78% to 10%	
20:19	Filled both steam generators to 85% indicated level – stopped "A" AFW pump	
20:22	Assessed impact of stopping RCPs on shutdown safety assessment – determined that both S/Gs will remain available for RCS decay heat removal via natural circulation	OP 2264, step 4.3.5
20:22	Stopped "A" and "B" reactor coolant pumps	
20:30	Entered TSAS 3.4.9.1 (RCS cooldown exceeded 30°F/hour limit) – cooldown rate was noted to <31°F/hour and less than the transient limit of 50°F/hour – cooldown rate was immediately restored to < 30°F/hour	CR-03-02320
21:07	Pumped containment sump from 78% to 10%	
21:39	Notified that radiography is completed in charging pump area	
21:52	Plant cooldown is terminated – RCS T_{ave} = 178°F	

Data Sources:

1. Millstone 2 Shift Manager's Log e-SOMS entries from 03/07/2003 at 00:00 to 03/09/2003 at 05:58
2. Health Physics Log e-SOMS entries from 03/07/2003 at 00:00 to 03/09/2003 at 00:00
3. Sequence of Events Log computer printout (SOLDATA.DAT;3097) – post trip SOE log from 03/06/2003 at 08:29:02 to 03/07/2003 at 14:44:19
4. Sequence of Events Log computer printout (SOLDATA.DAT;3103) – SOE log from 03/07/2003 at 14:30:35 to 03/07/2003 at 15:30:35
5. PPC Alarm Messages computer printout (QUEPRT.LIS;58) from 03/07/2003 at 13:01:07 to 03/07/2003 at 21:01:03
6. PPC Alarm Messages computer printout (QUEPRT.LIS;65) from 03/07/2003 at 21:01:03 to 03/09/2003 at 00:11:07
7. Operations "rough logs" from 3/7/2003
8. Plant Process Computer analog and digital data – stored at a 2 second resolution
9. Draft timeline of events generated by Event Review Team on 3/11/2003
10. Draft event timeline for charging system generated by Engineering on 3/14/2003
11. Security gate log 03/07/2003 from 14:00:00 to 23:00:59 (Stilphen, Jordan, Ewers and Saulter)